Factors Influencing the Consumption of Tobacco amongst the Khasi Indigenous People in Northeast India

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Abstract

Background: Tobacco use in any form is a major public health concern. It accounts for nearly 1.35 million deaths every year. Many chronic illnesses occur due to the consumption of tobacco, either smoke or smokeless form. The study aims to explore how smoking and smokeless tobacco consumption are distributed across a range of demographic and socioeconomic markers among Khasi indigenous people in Northeast India. **Materials and Methods:** It is a case-control study conducted in adults over 31 years of age. The study was carried out between June 2020 and August 2021. An Independent *t*-test was performed to determine the significant difference in age between smoking/smokeless tobacco users and non-tobacco users. Univariate and Multivariate analyses were conducted to determine the significant predictors affecting the use of smoking/smokeless tobacco in the respondents. **Results:** A total of 505 respondents were included in the present study. There was a high statistically significant difference in the income level of tobacco and non-tobacco users (P value- 0.002). In Univariate analysis, it was found that the odds of consuming both forms of tobacco were significantly lower in the respondents aged between 51–60 (OR = 0.61, P value = 0.0453). The participants who studied till graduation and above had lower odds of both using forms of tobacco as compared to respondents who were illiterate/primary educated only (OR = 0.85, P value = 0.046). **Conclusion:** In conclusion, smoking and smokeless tobacco consumption are still widely prevalent in this region and strongly associated with age, gender, level of education, and place of residence. There is a need for further detailed analysis to identify risk factors that are strongly associated with the use of smoke and smokeless tobacco so that the community will be conscious about the hazardous effects of tobacco use in any form.

Keywords: Demographic, Khasi, Northeast, smokeless, socioeconomic, tobacco

INTRODUCTION

India grapples with a dual challenge of tobacco consumption, encompassing both smoking and smokeless forms, which constitutes a significant contributor to global mortality, morbidity, and disability.[1–3] Notably, India stands as the world's second-largest consumer and the third-largest producer of tobacco.[4] Within the country, a multitude of tobacco products are readily available at remarkably low costs. The adverse consequences of tobacco use are particularly pronounced among adults, especially in low- and middle-income nations, where the burden of tobacco-related ailments and fatalities is most profound. This encompasses a spectrum of chronic diseases, including but not limited to cancer, respiratory conditions, cardiovascular disease, and stroke.[3,5] Data from the Global Adult Tobacco Survey (GATS) 2016–17 underscores the gravity of the situation, revealing a persistently high prevalence of both forms of tobacco use in India. Smoking tobacco use is documented at 10.38%, while smokeless tobacco use stands at a significant 21.38%.[3,6,7] Studies have revealed that North Eastern Regions are the most prevalent place for smoking and smokeless tobacco.[8] Out of 28 states, tobacco consumption is prominent in six northeastern states, and out of six states, Meghalaya is the second highest tobacco consumer after Mizoram.[9] This implies that smoking prevalence in Northeast India has remained consistently high throughout time due to regional and cultural demands, poor education, food habits, lifestyle,

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socioeconomic status, place of residence, and diverse ethnic groups.[8,10] In Northeast India, the most commonly used form of smokeless tobacco is "betel nut" or "betel quid." Studies revealed that betel quid (i.e., chewing paan) and gutka are established factors leading to a range of chronic diseases and health disorders. Smokeless tobacco (SLT) is deeply embedded in the sociocultural tradition of Northeast India, where the act of chewing it is an age-old local tradition. Typically, the consumption of betel nut involves the simultaneous use of betel leaf and slaked lime. In specific regions such as Meghalaya, where the Khasis reside, and in Assam, where the Assamese culture thrives, there is a time-honored tradition of offering a betel leaf combined with a betel nut to guests as a gesture of warm hospitality.[10-12] Notably, the Khasis hold the betel nut in high regard as a symbol of significant social egalitarianism. The Khasis consider betel nut as a tremendous social egalitarian. It is also known as "kwai".[13] the act and rules like the Cigarettes and Other Tobacco Product Act (COTPA) and National Tobacco Control Programme (NTCP) have been introduced to prevent smoking and smokeless tobacco.[13,14] In general, these measures contribute to a reduction in the prevalence of smoking and smokeless tobacco consumption in the nation. However, it is regrettable that Northeast India stands as an exception to this trend.[13]

This raises questions about the effectiveness of the implementation of rules and regulations made by the Government for the benefit of the human race. It is imperative to involve the community in the campaign to minimize tobacco use. This indicates the necessity for more in-depth research and monitoring of the factors contributing to tobacco consumption in the North Eastern Region. This might help to reverse the increasing trend in the use of tobacco in any form. The present study's objective is to explore the distribution of tobacco consumption among the Khasi indigenous people in Northeast India across various demographic and socioeconomic factors. The findings are valuable in identifying significant variables that have a direct impact on tobacco consumption in any form and in uncovering the risk factors associated with both smoking and smokeless tobacco use.

Material and Methods

Study design, place of study and details of participants

The case-control study was conducted from June 2020 to August 2021. The participants were recruited from the Civil Hospital of Shillong, East Khasi Hills, Meghalaya.

Inclusion criteria for the participants were: aged 31 years or older; had been admitted/visited the Civil Hospital of Shillong for any illness; participants who possessed the ability to read, speak, and understand either Khasi or English were included in the study; and were conscious and free from severe cognitive impairment (confirmed from the information obtained from the medical records and history taking). Participants who did not provide consent and belonged to vulnerable participant groups were excluded from the study, as they were unable to cooperate.

Study instruments: The data were collected using a structured questionnaire that included sociodemographic details as well as health-related information, such as any illnesses in the past and those currently ongoing. The health-related variables were cross-checked with the medical records of each participant and confirmed during the interviews.

Data Collection: All data were collected over a 14-month time span and were obtained from Shillong's Civil Hospital. It is a 600-bed hospital. The sample size was determined based on a 3% prevalence of tobacco use in the North East Khasi hills, a 4% margin of error, and a 95% confidence interval. The sample size was calculated through nMaster 2.0 software. Using the following values, the total sample size was found to be 505. Therefore, 505 participants were employed in this study using convenience sampling, and data were collected through face-to-face interaction. Participation was completely voluntary. No subsequent invitations were made to reach out to case study participants/family members who refused to participate. Before initiating the study, informed consent was obtained from all participants.

Outcome variables: The study employed three outcome variables, namely, Smokeless Tobacco (SLT) use, smoked tobacco use, and non-tobacco users. For any type of tobacco use, responses were coded as 1 to indicate "using either or both forms of tobacco" and 0 to represent "No tobacco use." In the present study, smoked tobacco products include bidi and cigarettes, while smokeless tobacco includes betel nut and dry tobacco leaf. Thereafter, participants were divided into two groups: one group consisted of participants who were using both forms of tobacco, that is, smoking and smokeless tobacco, while the other group included participants who were not consuming any form of tobacco, that is, non-tobacco users.

Exposure variables: The following are the demographic and health-related factors that have been studied on the outcome variable: Age, Gender (male and female), education (illiterate/primary, middle/high school, graduate and above), place of residence (rural and urban), and profession (unemployed/unskilled, semiskilled/skilled, professional), marital status (married, unmarried, divorced and widowed), and health-related issues (Asthma, thyroid, gastrointestinal, diabetes, COPD, tumor, etc)

Ethics approval: Before initiating the study, Institutional Ethics Committee approval has been taken from Amity University, Reference number: AUUP/IEC/2019-Mar/02.

Statistical analysis

Descriptive statistical analyses, including the calculation of means and standard deviations for continuous variables, and counts and percentages for categorical variables, were calculated. The normality of age data was assessed using the Shapiro–Wilk test. An independent *t*-test was performed to determine any significant age differences between smoking/smokeless tobacco users and non-tobacco users. Univariate and Multivariate analyses were carried out to identify significant

predictors affecting smoking/smokeless tobacco use among the respondents. All reported *P*- values are two-sided, and *P*- values less than 0.05 were considered to indicate statistical significance. All data entry and statistical analyses were performed using Statistical Package for the Social Sciences (SPSS®) Version 23.0 software.

RESULT

In the present study, 505 respondents were enrolled, which consisted of 249 females (49.31%) and 256 males (50.69%). It was found that 58.22% of participants were consuming tobacco, and 41.78% were non-consumers. The mean age of the non-tobacco users was 47.97 ± 10.51, and tobacco users were 45.71 ± 10.19, and it was found to be statistically significant (*P*- value = 0.016). Further, most of the females (64.93%) in the present study were not consuming tobacco, whereas more than two-thirds of male respondents consumed tobacco, and the difference in the consumption of both forms of tobacco among males and females was found to be statistically significant (*P*- values <0.001). Furthermore, the majority of tobacco users resided in rural areas, while non-tobacco users were evenly distributed between rural and urban areas. A significant difference was noted between smoking/smokeless tobacco users and non-tobacco users concerning their place of residence (*P*- value = 0.043).

The study results depicted that the individuals aged 30–40 years were massive consumers of tobacco. More than two-thirds of the non-tobacco users were less than 50 years of age, whereas this proportion goes close to three-quarters in the case of participants using smoking/smokeless tobacco. However, there was no significant difference in age groups between individuals who used tobacco and those who did not. More than 75% of the smoking/smokeless tobacco and non-tobacco users were married; however, it was not found to be statistically significant. It was also noted that more than 50% of the participants who consumed both forms of tobacco were illiterate or studied till primary class only.

Furthermore, no significant association was found between education level and the use of tobacco. It was also observed that the maximum number of the participants (71.09%) were unemployed/unskilled, whereas semiskilled/skilled workers and professionals were 13.07 and 15.84%, respectively, which remained almost the same when respondents were classified as tobacco and non-tobacco users. However, no significant correlation was observed between the level of education and tobacco usage. Since most of the respondents were unemployed, their income was less than Rs. 5000/-. In addition, a highly statistically significant difference in income level was observed between tobacco users and non-tobacco users (*P*- value = 0.002). Most of the participants were nonvegetarian (96.04%). Nonetheless, there was no significant distinction in dietary habits between individuals who used tobacco and those who did not. [Table 1].

Table 2 displays the outcomes of both univariate and multivariate logistic regression. It was found that the odds of consuming both forms of tobacco were significantly lower in the participants aged between 51–60 (OR = 0.61, *P*- value = 0.0453). Furthermore, males have significantly higher chances of using both forms of tobacco than females (OR = 3.01, *P*- value < 0.001).

It was also revealed that respondents living in rural areas had higher odds of both forms of tobacco use than respondents living in urban areas (OR = 1.44, *P*- value = 0.048). Education was also identified as a significant factor influencing tobacco usage. The participants who studied till graduation and above had lower odds of both using forms of tobacco as compared to respondents who were illiterate/primary educated only (OR = 0.85, *P*- value = 0.046). Furthermore, in the present data, unmarried participants had lower chances of consuming smoking/smokeless tobacco as compared to those who were married (*P*- value > 0.05). The study revealed that occupation, dietary habits, and income were not found to be statistically significant factors for both forms of tobacco users (*P*- value > 0.05).

It is interesting to note that respondents who did not disclose their income had higher chances of tobacco use than those whose salaries were less than Rs. 5000/- (OR = 2.38. *P*- value = 0.0001). So, we further examined whether factors found significant in univariate logistic regression could influence the use of tobacco in the respondents after adjusting with each other in the multivariate logistic regression analysis. Income, while initially significant in the univariate analysis, was not included in the multivariate analysis due to the non-significance of the nondisclosed category. Multivariate analysis revealed that all the factors significant in univariate analysis were also significant when adjusted with each other. However, education was the least significant predictor (*P*- value = 0.0449), while gender was the most significant predictor (OR 3.15) [Table 2].

Health-related illness of the participants encountered during data collection

As per the medical history of the participants, more than 75% of the participants who had tuberculosis (77.8%), asbestosis (75%), and diabetes (45%) were using both forms of tobacco.

DISCUSSION

Smoking and smokeless tobacco consumption place a significant burden of morbidity and mortality on public health. The aim of this study was to investigate the distribution of smoking and smokeless tobacco usage across various demographic and socioeconomic factors among the indigenous population in East Khasi Hills, Northeast India. The study results align with prior research, indicating that, in contrast to males, females were less likely to use either smoked or smokeless tobacco.[13,15] As per the GATS-India 2009–2010 report, the prevalence of tobacco consumption among adults over 15 years in Meghalaya is reported as follows: 55.2% for any form of tobacco, 19.5% for smokeless

Table 1: Sociodemographic characteristics of the respondents (*n*=505)				
	Tobacco users (Smoking and Smokeless Tobacco)		Total	*P*
	No	Yes		
Mean±S.D Age (in years)	47.97±10.51	45.71±10.19	45.65±10.37	0.016
Age group				
31–40	65 (30.81)	118 (40.14)	183 (36.24)	0.125
41–50	69 (32.7)	93 (31.63)	162 (32.08)	
51–60	53 (25.12)	59 (20.07)	112 (22.18)	
>60	24 (11.37)	24 (8.16)	48 (9.5)	
Sex				
Female	137 (64.93)	112 (38.1)	249 (49.31)	<0.001
Male	74 (35.07)	182 (61.9)	256 (50.69)	
Locality				
Rural	115 (54.5)	187 (63.61)	302 (59.8)	0.043
Urban	96 (45.5)	107 (36.39)	203 (40.2)	
Marital status				
Married	160 (75.83)	224 (76.19)	384 (76.04)	0.143
Unmarried	15 (7.11)	33 (11.22)	48 (9.5)	
Divorced/Widow	36 (17.06)	37 (12.59)	73 (14.46)	
Education				
Illiterate/Primary	102 (48.34)	159 (54.08)	261 (51.68)	0.118
Middle/Secondary	93 (44.08)	124 (42.18)	217 (42.97)	
Graduate and above	16 (7.58)	11 (3.74)	27 (5.35)	
Occupation				
Unemployed/Unskilled	149 (70.62)	210 (71.43)	359 (71.09)	0.786
Semiskilled/Skilled	30 (14.22)	36 (12.24)	66 (13.07)	
Professional	32 (15.17)	48 (16.33)	80 (15.84)	
Income				
<5000	100 (47.39)	107 (36.39)	207 (40.99)	0.002
5000–10000	25 (11.85)	28 (9.52)	53 (10.5)	
>10000	38 (18.01)	37 (12.59)	75 (14.85)	
Not Disclosed	48 (22.75)	122 (41.50)	170 (33.67)	
Dietary habit				
Vegetarian	8 (3.79)	12 (4.08)	20 (3.96)	1
Nonvegetarian	203 (96.21)	282 (95.92)	485 (96.04)	

SD=Standard deviation. *To compare the mean age, an independent *t*-test is used, whereas for comparing the sociodemographic variables between two groups, a Chi-square test is used

tobacco, 27% for smoking, and 8.7% for dual use.[16] According to the National Family Health Survey (NFHS 5) 2019–2020, 25.3% of women and 60.8% of men (aged 15–49 years) use some form of tobacco in Meghalaya.[10,17] However, in the present study, the consumption of both forms of tobacco among women in East Khasi Hills, Meghalaya, was found to be approximately 38%, indicating an increase in tobacco consumption among women in the region.[18] The results of the current study unveiled specifically those aged 30–40 years, exhibit the highest prevalence of tobacco use in both forms. This finding aligns with previous published literature.[19] Furthermore, income and education were significantly associated with tobacco use. This finding is supported by the study conducted in 2018 based on secondary data analysis, which concluded that illiterates had lower compliance rates with standards and were less likely to pay attention to health warnings on tobacco packaging.[10,20,21] Hence, the consumption of any type of tobacco was more

prevalent among individuals with lower levels of education and lower income.[13,22] The likelihood of using any form of tobacco was notably lower among respondents aged 51–60 (OR = 0.61, *P* value = 0.0453) and decreased gradually, which is in line with a study conducted among 300,000 individuals in 2003.[23] Furthermore, literature reinforced that illnesses such as respiratory, vascular, or neoplastic diseases initiated and worsened due to the consumption of smoking and smokeless tobacco. Our data shed some light on the risk factors of consuming tobacco; that is, the majority of the participants visited the hospital for certain illnesses such as asthma, COPD, diagnosed tuberculosis, etc., which are the prominent reasons for further chronic diseases such as cancer. However, asthma was significantly associated with the increased risk of lung cancer was concluded in one of the research studies conducted in 2017 (OR = 1.44; 95% CI 1.31–1.59; *P* < 0.00001; I2 = 83%).[24] Asthma patients who consume betel quid with or without tobacco may experience

Table 2: Logistic regression analysis (univariate and multivariate) and odds ratio for tobacco use in the respondents					
Variable	**Univariate analysis**			**Multivariate analysis**		
	Odds ratio	**95% CI**	**P**	**Odds ratio**	**95% CI**	**P**
Age 31–40	1			1		
Age 41–50	0.74	0.48–1.15	0.179	0.69	0.41–1.2	0.284
Age 51–60	0.61	0.38–0.99	0.0453	0.73	0.42–0.98	0.03193
Age >60	0.55	0.29–1.05	0.0686	0.49	0.28–1.11	0.07382
Female	1			1		
Male	3.01	2.08–4.35	<0.0001	3.15	2.19–5.11	<0.0001
Urban	1			1		
Rural	1.44	1.02–2.08	0.04	1.41	1.06–1.96	0.04891
Married	1					
Unmarried	1.57	0.83–2.99	0.1684			
Others	0.73	0.44–1.21	0.2272			
Illiterate/Primary	1			1		
Middle/Secondary	0.8553	0.5931–1.2336	0.403	0.97	0.69–1.5	0.9741
Graduate and above	0.441	0.1968–0.9884	0.0468	0.71	0.51–0.99	0.0449
Unemployed/Unskilled	1					
Semiskilled/Skilled	0.8514	0.5021–1.4437	0.5505			
Professional	1.0643	0.6493–1.7444	0.8048			
Vegetarian	1					
Mixed	0.96	0.61–1.52	0.8691			
Income <5000	1					
5000–10000	1.05	0.57–1.92	0.8822			
>10000	0.91	0.54–1.54	0.7264			
Not disclosed	2.38	1.54–3.66	0.0001			

CI=Confidence interval

worsening of symptoms due to the presence of the arecoline, a stimulant extracted from areca nut.[25] In addition, tuberculosis can increase the likelihood of lung cancer development by inducing significant and prolonged inflammation within the lungs, which can result in damage to host tissues, fibrosis, genetic mutations, and other factors. The association between tuberculosis and tobacco use has already been established in many studies.[26,27] The major health consequences linked with the consumption of tobacco (in any form) in India, especially in the eastern regions, include cancers of several sites, poor reproductive outcomes, respiratory illness, hypertension, fibrosis, behavioral changes, etc.[28] Therefore, further spatial analyses could be useful to identify risk factors that are directly linked to tobacco consumption (both smoking and smokeless) among the indigenous population from East Khasi Hills, Northeast India.

CONCLUSION

The current study revealed that smoking and smokeless tobacco consumption is a common problem in the East Khasi Hills of northeast states and are strongly associated with age, gender, educational attainment, and residential location. Participants reported health-related complications during the data collection, which served as prominent risk factors for the development of more severe health issues associated with the consumption of tobacco in both forms. Even though there is a fundamental understanding of the adverse consequences of

tobacco consumption within the community, its usage remains widespread in the region. Therefore, it has become imperative to conduct further research on the risk factors associated with the consumption of tobacco among the indigenous community. This can be useful in creating awareness and educating people at the community level (in their local language) to reduce the burden of tobacco in this region.

Limitations and Strength of the Study

This study has a few limitations, including its single-hospital setting and exclusive recruitment from the Civil Hospital of Shillong, which may not fully represent the diverse population of Northeast India. The study design might not account for long-term trends in tobacco consumption, and a longitudinal study may help address this limitation. In addition, the National Family Health Survey (NFHS) data referenced in the discussion is community-based, whereas the current study is hospital-based, potentially affecting the generalizability of the findings.

On the positive side, the study benefits from a relatively large sample size of 505 participants, allowing for more robust results. It also considered a comprehensive range of demographic and socioeconomic factors and obtained ethical approval for the research. Multivariate logistic regression was conducted to identify significant predictors affecting tobacco use, offering a more thorough data analysis. Furthermore, the collection of health-related information from participants

contributes to understanding the relationship between tobacco consumption and various health conditions. The study also raised awareness of the existence and impact of tobacco control acts and rules.

In addition, it is worth noting that the study also emphasized the importance of creating awareness and educating people at the community level, particularly in their local language. This approach can significantly contribute to reducing the burden of tobacco consumption in the region.

Conflicts of interest
There are no conflicts of interest.

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